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3. "On the Algebraic Expression of the Number of Partitions of which a given number is susceptible." By Sir John F. W. Herschel, Bart., K.H., F.R.S. &c.

The object of this paper is to exemplify and extend the mode of analysis explained by the author in two former communications to the Royal Society "On the Development of Exponential Functions," and "On Circulating Functions," to a case in the theory of numbers in which they afford remarkable facilities, viz. that of the partitions of which a given number is susceptible. The separation of the symbols of operation from those of quantity, in the mode explained in the former of those communications, allows of the expression of the sums of certain series entering into this theory, under a form susceptible of resolution (by a theorem here given) into two portions, one of which, a rational function of the independent variable or number to be subdivided, expresses approximately, as a rational fraction, the number of partitions; the other, a periodic or circulating function, expresses the fraction, less than unity, by which the other portion differs from an exact integer number, and which, applied with its proper sign to that former portion, reduces it to an integer. In the mode of procedure here followed all subdivision into cases according to the numerical constitution of the number to be subdivided is avoided, and a uniform treatment is carried throughout.

May 30, 1850.

The EARL OF ROSSE, President, in the Chair.

Sir Benjamin C. Brodie, Bart., gave notice, that, at the next ordinary Meeting of the Society, he would propose the Right Honourable Lord Londesborough for election into the Society.

Mr Weld communicated the following particulars respecting the original model of the safety-lamp which was presented to the Society at this meeting by Joseph Hodgson, Esq., F.R.S.

In November 1815, Sir Humphry Davy read a paper before the Royal Society 'On the Fire damp of Coal Mines, and on Methods of lighting the Mines so as to prevent its Explosion.' In this communication he described a safe light, "which became *extinguished* when introduced into very explosive mixtures of fire-damp:" but as this fell short of the philosopher's wishes, he instituted a fresh series of experiments, which resulted in his invention of the safety-lamp described in a paper read before the Society in January 1816. "The invention," he says, "consists in covering or surrounding the flame of a lamp or candle by a wire sieve;" and he adds, "when a lighted lamp or candle screwed into a ring soldered to a cylinder of wire gauze, having no apertures except those of the gauze, is introduced into the most explosive mixture of carburetted hydrogen and air, the cylinder becomes filled with a bright flame, and this flame continues to burn as long as the mixture is explosive." The model in the possession of the Royal Society answers in every respect to

this description, and to the representation of the lamp which accompanies the paper. It was made by Sir Humphry's own hands, and given by him to Dr. Lee, now Lord Bishop of Manchester, whose father was Assistant Secretary to the Royal Society at the time of Davy's Presidency. The excessive simplicity of the contrivance is most remarkable; but this is one of the greatest advantages which attended the invention. As the author remarks in the paper just quoted, "All that the miner requires to ensure security, are small wire cages to surround his candle or lamp, which may be made for a few pence, and of which various modifications may be adopted. And the application of this discovery will not only preserve him from the fire-damp, but enable him to apply it to use and to destroy it at the same time that it gives him a useful light." A month after the invention Sir Humphry informed the Society that his cylinder lamps had been used in two of the most dangerous mines near Newcastle with perfect success.

The following papers were then read:—

1. "On the Structure of the Dental Tissues of Rodentia." By John Tomes, Surgeon-Dentist to Middlesex Hospital. Communicated by William Bowman, Esq., F.R.S.

The author in this paper relates the results obtained from an extensive series of investigations on upwards of sixty of the more typical members of the order Rodentia. He finds, that not only are the teeth of animals of this order distinguished by strongly marked structural peculiarities (hitherto not recognised) from other mammalian teeth, but also that the teeth of the several larger groups are distinguished from each other by modifications in what may be called the rodential type of dental tissue. Mr. Tomes pointed out, in a paper published in Part 2 for 1849 of the *Phil. Trans.*, that in the teeth of marsupial animals the dentinal tubes are continued into the enamel. In the present communication he shows that the structural peculiarities which characterise and are confined to the teeth of rodents are also mainly resident in the enamel. The earlier pages of the paper are devoted to a description of those structural conditions which are common to the teeth of the whole order. Amongst these, the author finds that the extremities of the dentinal tubes, which in the lower part of the tooth communicate with the pulp-cavity, become in the extruded portion sealed up by the development of a layer of non-tubular tissue which is formed at and near the apex of the pulp-cavity. This closure of the dentinal tubes is not however confined to the teeth of Rodentia, but occurs in all teeth in those parts exposed to wear. A similar condition is found to obtain in the osseous tissue which forms the antlers of the Deer-tribe. If a portion of an antler previous to its losing its periosteum be examined, ordinary Haversian systems are found: but if an antler which has been shed be examined, each of the larger Haversian systems will be found to be lined by a layer of transparent tissue destitute both of lacunæ and canaliculi. The author considers these conditions to indicate the existence of a general law, viz. that dense tubular tissues, when about to be exposed to wear or about to be